not so far accepted in Germany, but did not oppose the adoption of these symbols by the I.E.C.

II.—*Units. Signs for Names of Units.*

Signs for names of electrical units to be employed only after numerical values :—

NAME OF UNIT	SIGN
1. Ampere	A
2. Volt	V
3. Ohm	*
4. Coulomb	C
5. Joule	J
6. Watt	W
7. Farad	F
8. Henry	H
9. Volt-coulomb	VC
10. Watt-hour	Wh
11. Volt-ampere	VA
12. Ampere-hour	Ah
13. Milliampere	mA
14. Kilowatt.	kW
15. Kilovolt-ampere	kVA
19. Kilowatt-hour.	kWh

m	sign for milli-	μ	sign for micro- or micr-
k	sign for kilo-	M	sign for mega- or meg-

* As a sign for the ohm, one of the two letters O or Ω is provisionally recommended. The letter Ω should no longer be used for megohm.

III.—*Mathematical Symbols and Rules.*

NAME	SYMBOL	Symbols recommended for the case in which the principal symbol is not suitable
Total differential	d	d
Partial differential	∂	
Base of Napierian logarithms	e	ϵ
Imaginary $\sqrt{-1}$	i	j
Ratio of circumference to diameter	π	
Summation	Σ	
Summation, integral	$\int$	

1. Ordinary numerals as exponentials shall exclusively be used to represent powers. (In consequence, it is desirable that the expression $\sin^{-1}x$, $\tan^{-1}x$, employed in certain countries be expressed by arc $\sin x$, arc $\tan x$.)

2. The comma and the full-stop shall be employed for separating the decimals according to the custom of the country but the separation between any three digits constituting a whole number shall be indicated by a space and not by a full-stop or a comma (1 000 000).

3. For the multiplication of numbers and geometric quantities, indicated by two letters, it is recommended to use the sign ×, and the full-stop only when there is no possible ambiguity.

4. To indicate division in a formula, it is recommended that the horizontal bar or the colon be employed. Nevertheless the oblique line may be used when there is no possibility of ambiguity; when necessary, ordinary brackets ( ), square brackets [ ], and braces { } may be employed to obtain clearness.

IV.—*Abbreviations for Weights and Measures.*

Length :—m; km; dm; cm; mm; $\mu=0{\cdot}001$ mm.

Surface :—a; ha; m^2; km^2; dm^2; cm^2 mm^2.

Volume :—l; hl; dl; cl; ml; m^3; km^3; dm^3; cm^3; mm^3.

Mass :—g; t; kg; dg; cg; mg.

V.—*Name for Electrical Unit.*

The I.E.C. will recommend to the International Congress of the Applications of Electricity, to be held in San Francisco in 1915, the adoption of the name "Siemens" for the unit of conductance.

GERMAN METHODS IN COMMERCE.

A PAPER on the organised methods employed by Germany in commerce, prepared by Sir William Ramsay for the Institute of Industry and Commerce, was referred to in a paragraph in NATURE of December 24 (p. 457). By permission of the institute, the article is here reprinted in full.

It has not been generally known that in commerce, as in war, the methods employed by Germany have been completely organised for many years. Instead of looking on commerce as an arrangement for mutual benefit, the German nation has regarded it as a war, And just as in the present war all methods of attack are regarded by the military advisers of Germany as legitimate, so we are slowly awaking to the knowledge that German commercial and industrial methods have for years been aggressive. The war in which we are now engaged is, indeed, a war for the liberation of nations from commercial and industrial brutality, as well as for their deliverance from an attempted enslavement to German "Kultur," as exemplified by the practices of their army.

At the annual meeting of the Society of Chemical Industry in 1903 I pointed out that the German military organisation had its counterpart in their commercial organisation; that there exists an Imperial Council whose proceedings are kept quiet, but which takes into consideration all obtainable statistics, and as far as possible legislates, or endeavours to legislate, on the basis of these statistics. Where fiscal duties are found to be required, such a council puts them on; where there is an advantage in taking them off, they are removed. Where cheap transit is possible they give it; for the railways are the property of the State. I then said :—"Is it to be expected that any country can fight such a combination as that without adopting, at all events, something of their methods, or without studying their methods, and without combining together, if not to imitate them, at least to thwart them? There is a military campaign against us, and we must defend ourselves."

The competition in the colour trade, for instance, has almost prohibited the manufacture of dyes in England. In Germany the management is in the hands of well-trained men, who, aided by an efficient staff of engineers and chemists, are continually engaged on the problems of utilising any discovery made in their own laboratories or elsewhere, and making it commercial, whether by securing cheap raw material, cheapening the process of manufacture, or creating a public demand for the object to be manufactured. Agencies are maintained all over the world whereby the article is introduced to the notice of foreign purchasers; and an extensive credit system is encouraged. All this is legitimate; but the maintenance of a trained legal staff, not merely to advise as to the validity of patents, but to advise whether the infringement of

© 1915 Nature Publishing Group

another's patent is likely to be successful, and whether it may not be possible, by infringing a patent, so to saddle an opponent with legal expenses as to break his competition, is not easily defensible. Fair competition between individuals lies at the bottom of all trade; unfair competition, backed by all the resources of the State, is what we have had to face with Germany.

We have recently had brought to our notice German methods applied to the shipping industry, and the Australians have been pointing out that the control of the "base metal market" is almost entirely in German hands.

It is necessary to go further; just as the German State has shown itself to be no respecter of treaties, just as the leaders of the German army have revealed themselves as breakers of every humane law, treacherous and deceitful, so long as they think they can gain their ends, so it is foolish not to be warned that the German nation as a whole, is completely unworthy of trust; that commercial agreements are regarded by members of that nation as binding only so long as some advantage is to be gained by keeping to them, and that dishonesty is excusable if only it appears to lead to German prosperity. For there is a sort of debased patriotism in the average German mind, "Deutschland, Deutschland über alles, über alles in der Welt," no matter how the supremacy of "Deutschland" is secured.

We were shocked at the beginning of the war by the disregard towards treaties displayed by our opponents; we were amazed at the treatment of Belgian non-combatants; and we are slowly realising that every trick, from firing on the Red Cross to the false display of the white flag of surrender, is made use of by the enemy, and not, be it observed, by individual groups of our opponents, but by command from high quarters. We are slowly and incredulously awakening to the knowledge that German commercial tricks are on a par with their tricks in war: that the whole nation is infected by the microbe of dishonour and dishonesty.

Of course, there are honest men among our opponents; from time to time we read of kind acts to our wounded; and from a lifelong experience of Germany and the Germans I have no hesitation in stating there are Germans as kindly, as honest, and as upright as there are among ourselves, the French, the Americans, and among the inhabitants of all other nations. That is not the point. What we have to face is a nation organised for a policy of dishonesty; and a nation which, as a nation, approves of that policy. Moreover, this nation believes that the policy of dishonesty is likely to be a successful one, and it has the will, and believed itself to have the power, to enforce this policy on the whole world. Conscientious Germans have been impressed more by the end than by the means adopted to gain that end: the prosperity of their "Vaterland."

I conceive that the main purpose of the Institute of Industry and Commerce is to take counsel and evolve some means for combating this attack. Just as it is clear that peace can never be declared until the chance of another Teutonic outburst is made impossible, by the total disbandment of the German army, so it must be evident that the commercial system of Germany cannot be allowed to continue. It is probable that it is better to make a beginning by an alliance of science, industry, and commerce, such as the institute contemplates; but it will be necessary, if the future German State is allowed to retain the power of waging an industrial war, to combat it by the action of the organised British nation, that is, by the State. Once that conquest is achieved, however, we should do well to remember that commerce should be co-operative and not competitive; that it is to our interest not only that we ourselves should prosper, but that others should also prosper; that, indeed, our own prosperity is bound up in the prosperity of our fellow-creatures.

WILLIAM RAMSAY.

STATE AID FOR SCIENCE.[1]

Introductory.

ELEMENTARY education and the training of teachers for work in elementary schools have been the object of State solicitude for the past eighty years. Increasing sums of money have been devoted to these two purposes; rules and regulations in rich variety have been framed for the proper disposal of this money, and some of the ablest and most energetic administrators have spent their lives in the endeavour to carry them out; a vast system of officials and organisations has arisen to see that no possible flaw or fault remains in the effective distribution of the sums annually voted by the State; and yet the general consensus of opinion among those best qualified to judge is that the results achieved are very poor, that they are transient in effect and occasionally even harmful rather than beneficial. Gigantic efforts have been and are being made, yet the results are plainly incommensurate with the outlay; very few indeed being satisfied that the State and the locality are getting money's worth for their expenditure.

This then being the present position as regards the problem of elementary education let us now see how far the same position is true in regard to the small portion of the State's annual expenditure on education of all types and degrees which is specifically earmarked for the promotion of science teaching, scientific training, and research. It may perhaps turn out to be true that the ineffectiveness of much of our educational system is due to the absence of the scientific spirit among our administrators and teachers, to lack of definite knowledge of the capabilities of the child mind, and neglect of the conclusions which science, if properly studied, could have supplied.

Taking as the basis of our investigations the various sums voted by the State for the promotion of science during the past sixty years, we can from the variations in the amounts, and in the particular objects for which these amounts were granted, observe how the encouragement given to science has fluctuated. For this purpose the Estimates annually presented to Parliament are the most trustworthy guide—a guide who, however, frequently leads one astray.

The task of following any particular item of the Vote from year to year is rendered difficult from the various reorganisations and rearrangements occasioned by the changes made from time to time in the organisation of the various offices, as, for example, when the control of science instruction in Scotland was transferred to the Scottish Education Department in 1897–8, and that for Ireland in 1899–1900 to the Board of Agriculture and Technical Instruction. Nor is this the only source of confusion. Sub-heads dealing with science are sometimes kept separate from and sometimes amalgamated with those relating to art, so that it is not possible to say with certainty whether a particular form of aid has increased, diminished, or disappeared.

This difficulty becomes accentuated in the year 1900, when the Science and Art Department became amalgamated with the Education Department, and the two started anew on their official career as the Board of Education. In subsequent Estimates votes were

---

[1] Abridged from a paper read before Section L of the British Association at Melbourne, by C. A. Buckmaster.

© 1915 Nature Publishing Group